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Hunters Point Naval Shipyard
Department of the Navy
Base Realignment and Closure

Parcel F Background

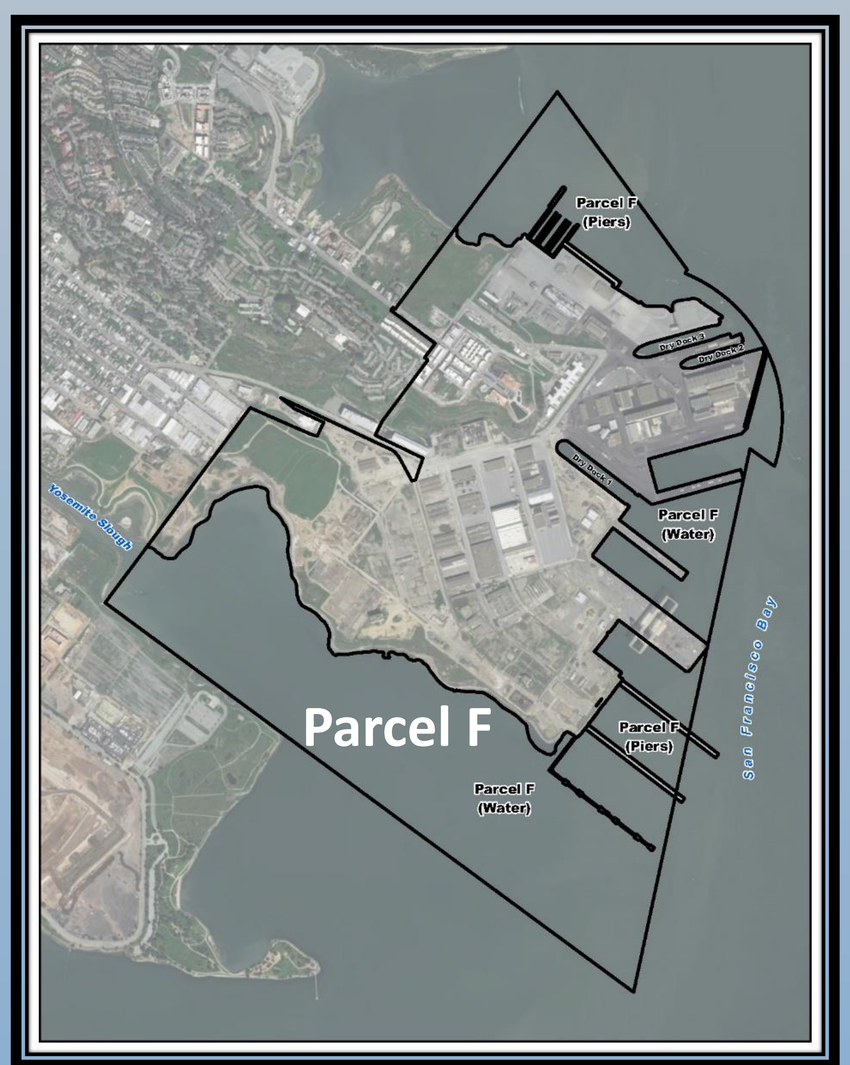
Parcel F Background and Source of Contamination

Past shipyard operations have contributed to polychlorinated biphenyl (PCB), copper, lead, and mercury contamination of sediment in certain offshore areas of Parcel F.

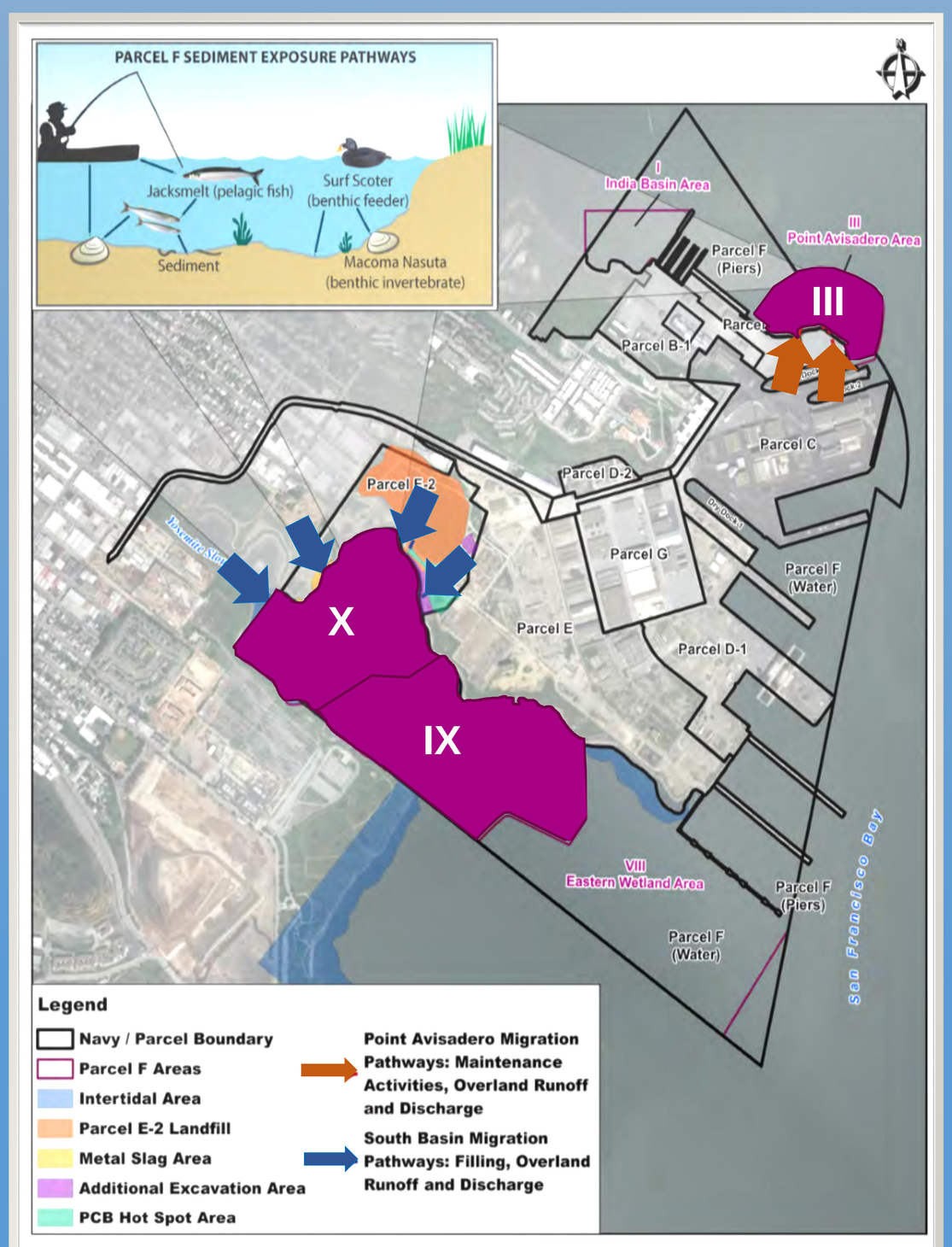
The Proposed Plan summarizes the cleanup methods evaluated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and explains the basis for choosing the cleanup alternatives being considered for sediment contamination at Parcel F.

Active cleanup is limited to Areas III, IX, and X because these are the only Parcel F areas that pose unacceptable risk to human health or the environment.

Removal and cleanup actions have been conducted at upland Parcels B, E, and E-2 to remove contamination sources to prevent further migration of contaminants into Parcel F.



Parcel F consists of 446 acres of sediment that surround HPNS



How did the contaminants migrate into Parcel F?

These chemicals migrated to San Francisco Bay through:

- Groundwater discharge
- Storm and surface water runoff
- Soil erosion

Natural processes such as wave action, strong currents, and animal burrowing activity can disturb sediment and bring contaminants to the surface where human and animal receptors may be exposed.

Current potential human receptors at the site include individuals consuming shellfish and sportfish, as well as individuals incidentally exposed to sediment during harvesting and cleaning of shellfish.

Ecological receptors include birds feeding on aquatic organisms living within the sediment, including benthic invertebrates (e.g. clams) and fishes.

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Parcel F
Summary of Risk

Summary of Risk

"Risk" is the likelihood or probability that a hazardous chemical, when released to the environment, will cause negative health effects (such as cancer or other illness) to exposed humans and wildlife.

Human Health Risk Assessment

The Navy calculated the potential cancer and noncancer risk to adults from eating fish and shellfish and direct contact with sediment during shellfish collection (Table 1). PCBs were the only contaminant shown to cause potential risk to humans who consume shellfish and fish collected at HPNS.

Table 1. Human Health Cancer Risks and Noncancer Hazards from Sediment and Consumption of Fish and Shellfish

Chemical	Exposure Pathway	Area-Specific Human Health Risk Estimate				
		I	III	VIII	IX	X
Excess Lifetime Cancer Risk						
Total PCBs	Direct Contact Sediment	*3 x 10^{-6}*	5 x 10^{-7}	9 x 10^{-7}	1 x 10^{-7}	*5 x 10^{-5}*
Total PCBs	Shellfish Consumption	3 x 10^{-7}	4 x 10^{-7}	7 x 10^{-7}	*6 x 10^{-6}*	*8 x 10^{-6}*
Total PCBs	Fish Consumption			*9 x 10^{-5}*		
Noncancer Hazard Quotient						
Total PCBs	Direct Contact Sediment	0.006	0.1	0.002	0.02	0.1
Total PCBs	Shellfish Consumption	0.02	0.04	0.06	0.2	0.4
Total PCBs	Fish Consumption			**8**		

Italic: Exceeds cancer risk of 1 x 10^{-6} (1 in 1,000,000 chance of getting cancer)
Bold number: Exceeds cancer risk of 1 x 10^{-4} (1 in 10,000 chance of getting cancer) or Hazard Quotient of 1 (threshold level above which health may be negatively affected).
Footnote: The fish consumption pathway showed unacceptable noncancer risk for all of Parcel F, but only Areas III, IX and X have PCBs exceeding background as measured on an area weighted basis.
Source: Final Addendum to the Feasibility Study Report for Parcel F, Hunters Point Naval Shipyard, San Francisco California. KCH, 2017.

Ecological Risk Assessment

The ecological risk assessment considered risks to wildlife such as a bird named the Surf Scoter feeding on organisms such as clams, snails, worms, or insects (Table 2).

The Surf Scoter was chosen as a representative species due to its feeding pattern and presence at Parcel F.

Table 2. Ecological Risk Assessment Summary Risk Drivers

Chemical	Receptor	Area-Specific Hazard Quotient (Unitless)				
		I	III	VIII	IX	X
Copper	Surf Scoter	0.5	**3**	0.7	0.7	0.8
Mercury		0.3	**4**	0.3	0.3	0.3
Total PCBs		0.1	0.3	0.2	**1**	**2**

Source: Hunters Point Shipyard Parcel F Validation Study Report, San Francisco, California. Battelle, Blasland, Bouck & Lee, Inc. and Neptune and Company, 2005.
Note: The Navy and regulatory agencies decided to take action at Area IX since the total PCB area weighted average exceeds background, even though the hazard quotient is at or below 1 and the not-to-exceed RAO 1 PCB PRG was not exceeded.

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Parcel F
Cleanup Goals

Remedial Action Objectives (RAOs)

The three RAOs for Parcel F Areas III, IX and X, are focused on exposure from consumption of fish and shellfish by humans and wildlife:

1. **RAO 1**. Reduce the risk of benthic feeding and fish-eating birds, including surf scoters, to acceptable levels from exposure to copper, lead, mercury, and total polychlorinated biphenyls (PCBs) through eating of contaminated prey and incidental ingestion of sediment.

2. **RAO 2**. Limit or reduce the potential risk to human health from eating shellfish from Parcel F.

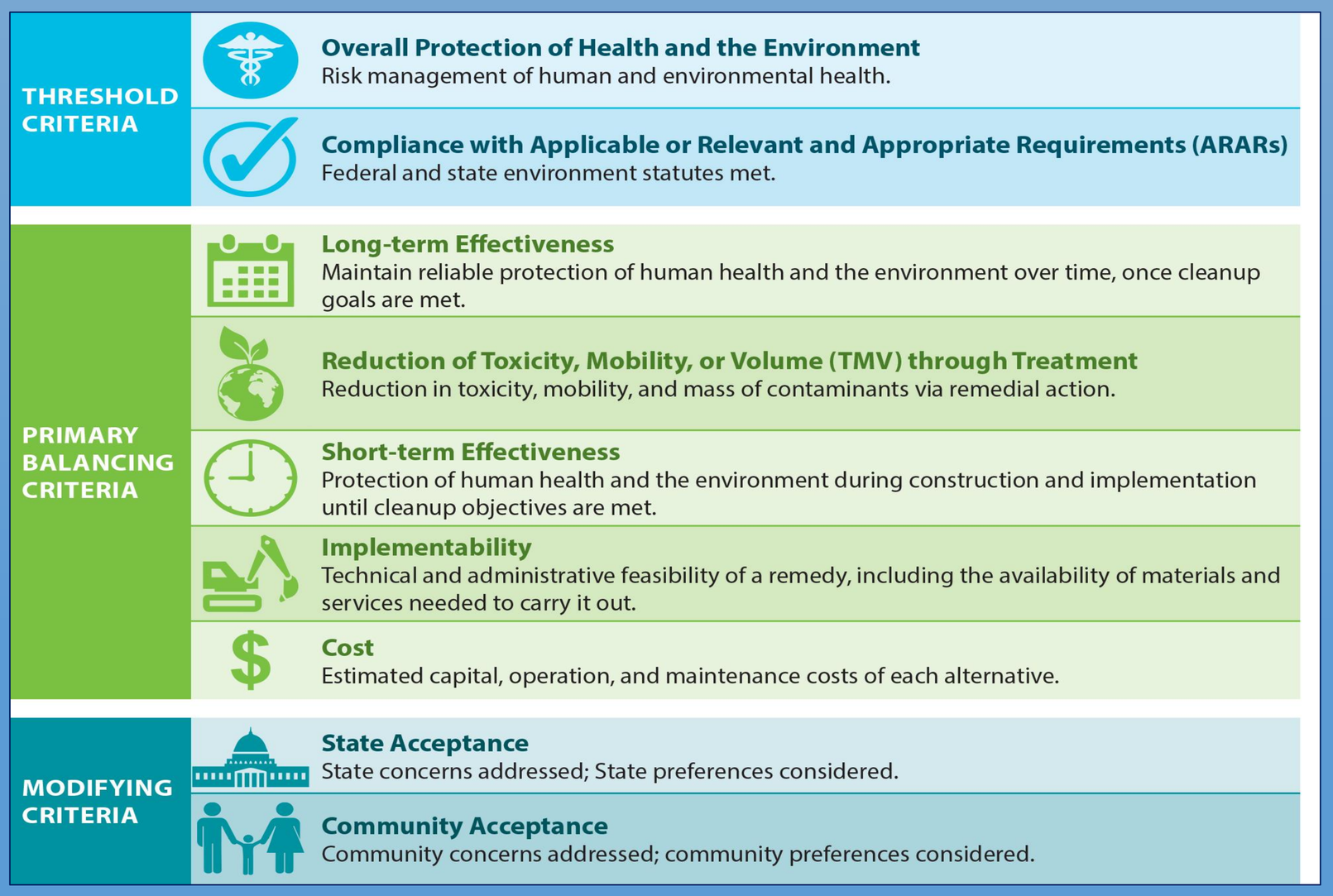
3. **RAO 3**. Limit or reduce the potential biomagnification of total PCBs at higher trophic levels in the food chain to reduce the potential risk to human health from eating sport fish.

Parcel F Preliminary Remediation (Cleanup) Goals (Not-to-Exceed Values unless indicated)			
Total PCBs (µg/kg)	**Copper (mg/kg)**	**Mercury (mg/kg)**	**Lead (mg/kg)**
1,240/1,350/200*	271	1.87	**

mg/kg = milligrams per kilogram; µg/kg = micrograms per kilograms

* A not-to-exceed value of 1,240 µg/kg for total PCB concentration meets the cleanup goal of RAO 1. An area weighted average concentration for total PCBs of 1,350 µg/kg will meet the cleanup goal of RAO 2. In addition, a total PCB concentration of 200 µg/kg is representative of background total PCBs for nearshore sediments in San Francisco Bay and meets RAO 3 cleanup objectives.

** A cleanup goal for lead was not developed due to uncertainty associated with bioavailability and toxicity of lead. Lead is collocated with PCBs in sediment, so achieving the cleanup goals for PCBs is expected to address risks associated with lead.



National Contingency Plan (NCP) Evaluation Criteria

The Navy evaluated six Cleanup Alternatives for Area III and nine Cleanup Alternatives for Areas IX and X based on seven of the nine criteria specified by federal regulations in the NCP. Community acceptance will be evaluated based on comments received from the public during the public comment period. State acceptance will be evaluated through on-going discussions with State of California regulatory agencies.

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Parcel F Comparison of Cleanup Alternatives

Comparison of Cleanup Alternatives for Area III

	Alternative 1 No Action	Alternative 2 Removal and Off-Site Disposal	Alternative 3 Removal, Off-Site Disposal, Armored Cap and ICs	Alternative 3A Removal, Off-Site Disposal, Reactive Cap and ICs	Alternative 4 Removal, Off-Site Disposal, Modified Armored Cap and ICs	Alternative 4A Removal, Off-Site Disposal, Modified Reactive Cap and ICs
Overall Protection of Human Health and the Environment	Not Protective	Protective	Protective	Protective	Protective	Protective
Compliance with ARARs	Does not comply with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs
Long-Term Effectiveness and Permanence	○	◑	◑	◑	◑	◑
Reduction in Toxicity, Mobility and Volume through Treatment	○	○	○	○	○	○
Short Term Effectiveness	○	◑	◑	◑	◑	◑
Implementability	●	◑	◑	◑	◑	◑
Cost ($M)[1]	**$0**	**$15.4**	**$12.9**	**$15.9**	**$7.3**	**$9.2**

○ Low ◐ Low to Moderate ◑ Moderate ◑ Moderate to High ● High ■ Preferred Alternatives

[1] Costs from Parcel F FFS have been escalated by 2.1% per year to represent costs in 2017 dollars.

ICs =Institutional Controls

Comparison of Cleanup Alternatives for Areas IX and X

	Alternative 1 No Action	Alternative 2 Removal and Off-Site Disposal	Alternative 3 In Situ Treatment[2] and ICs	Alternative 4 MNR and ICs	Alternative 5 Removal, Off-Site Disposal, MNR and ICs	Alternative 5A Removal, Activated Backfill, Off-Site Disposal, MNR and ICs	Alternative 6 Removal including Shoreline, Off-Site Disposal, and MNR and ICs	Alternative 6A Removal including, Shoreline, Off-Site Disposal, and MNR and ICs	Alternative 7 Removal, In Situ Treatment, Off-Site Disposal, MNR and ICs
Overall Protection of Human Health and the Environment	Not protective	Protective	Protective	Protective	Protective	Protective	Protective	Protective	Protective
Compliance with ARARs	Does not comply with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs
Long-Term Effectiveness and Permanence	○	◑	○	◑	●	●	●	●	●
Reduction in Toxicity, Mobility and Volume through Treatment	○	○	◑	○	○	◑	○	◑	◑
Short Term Effectiveness	◑	◑	◑	◑	◑	◑	●	●	◑
Implementability	●	◑	◑	◑	◑	◑	◑	◑	◑
Cost ($M)[1]	**$0**	**$39.7**	**$18.1**	**$2.6**	**$20.9**	**$27.2**	**$21.3**	**$28.1**	**$23.0**

○ Low ◐ Low to Moderate ◑ Moderate ◑ Moderate to High ● High ■ Preferred Alternatives

[1] Applicable cost elements from Parcel F FFS have been escalated by 2.1% per year to represent costs in 2017 dollars

[2] This technology was referred to as in situ stabilization in the Parcel F FFS, but is referred to here as in situ treatment, which is more appropriate for the application of carbon-based amendments. Stabilization technologies often use other amendments (i.e. cement) which are not included here.

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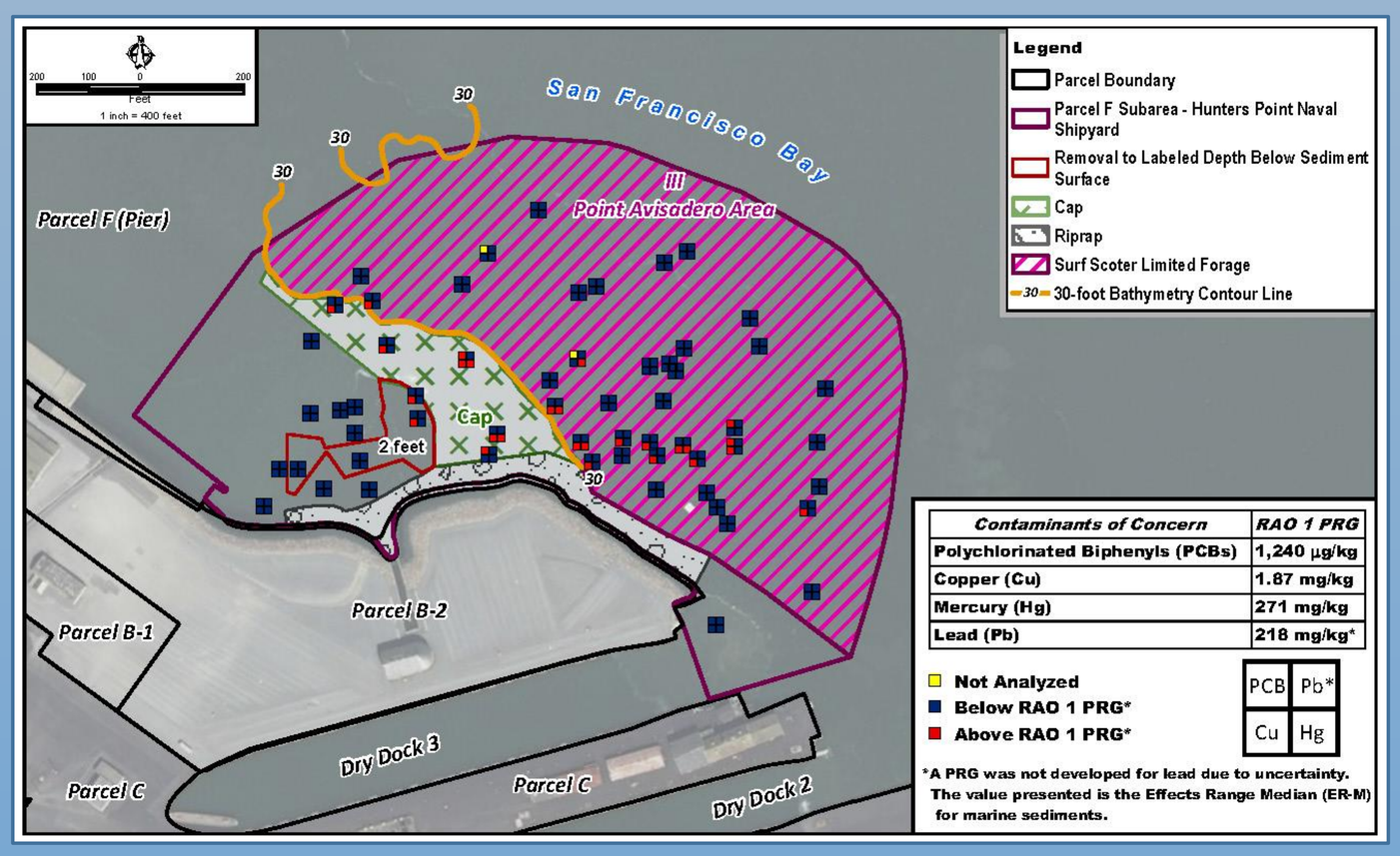
Parcel F Summary of Proposed Cleanup Alternatives

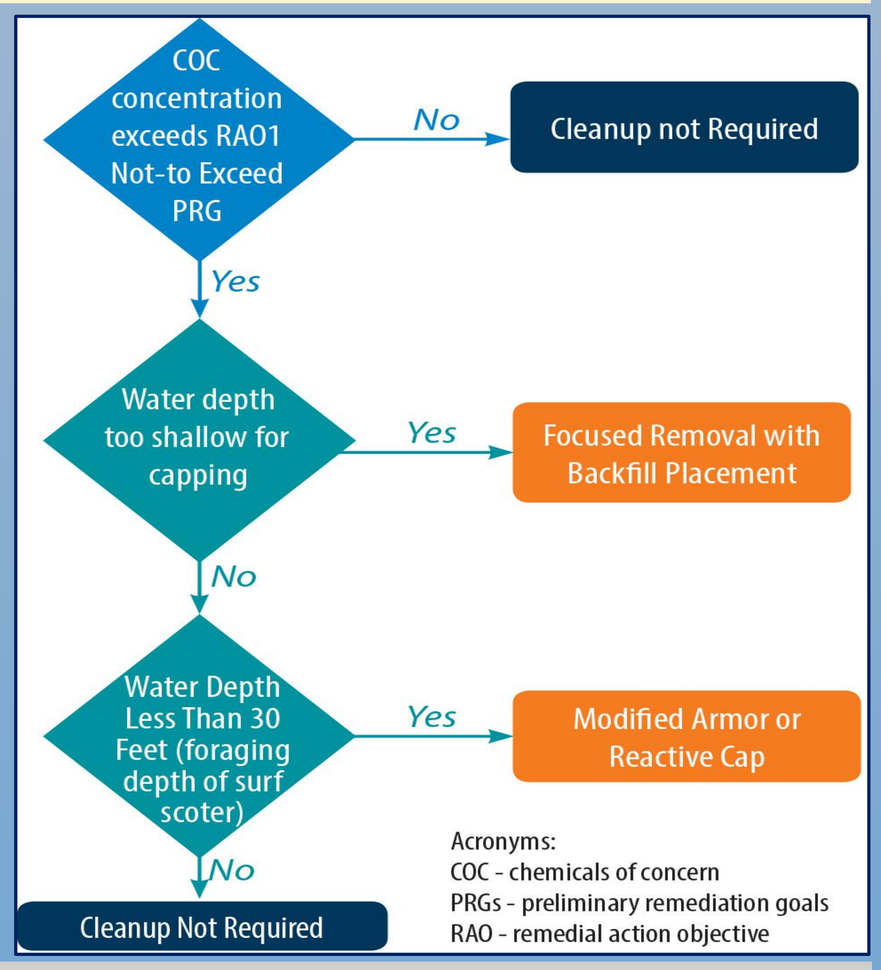
Summary of Cleanup Alternatives and Decision Matrix

The Navy proposes the following preferred cleanup plan:

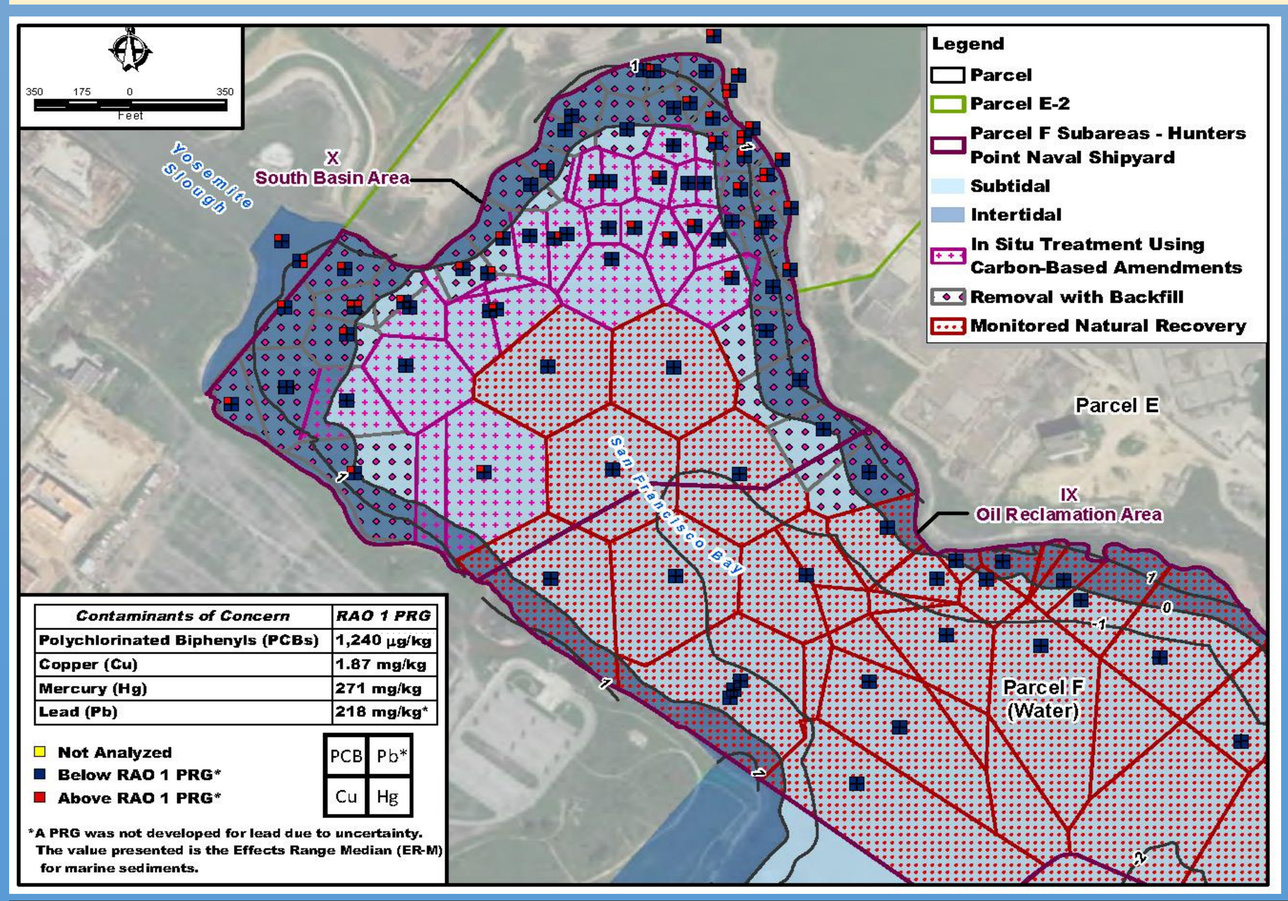
- **Area III:** Capping to prevent contact with metals (copper, lead, and mercury) or PCBs in sediment in water depths less than 30 feet and focused excavation or dredging of nearshore sediments.
- **Areas IX/X:** Treating sediment in deeper water using carbon-based amendments (i.e., treatment media). Focused excavation or dredging of sediments in shallow water areas or where very high concentrations of PCBs are present. Monitored natural recovery (MNR) of sediments where levels of PCBs are lower but exceed background levels established for nearshore sediments within San Francisco Bay.
- **Parcel F Site-wide Institutional Controls (ICs):** Limit public exposure and maintain the integrity of the remedy.

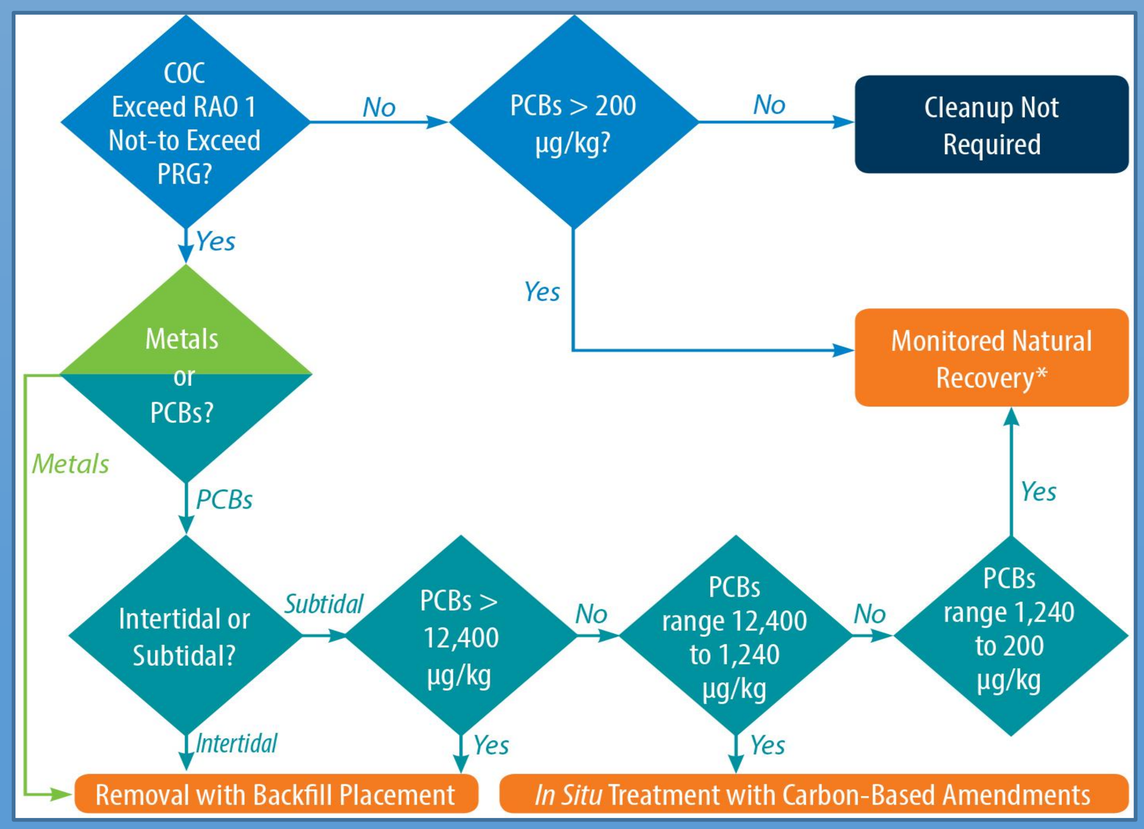
Area III





Areas IX and X





*Based on constructability considerations, sediments below the not-to exceed PRG may be cleaned up through removal with backfill or *in situ* treatment with carbon-based amendments depending on location to facilitate MNR.